

B1
cont

ii) an autocatalytic compound or group, said autocatalytic compound or group generating a protecting group removing product when said autocatalytic compound is activated by said catalyst; and.

b) irradiating at least a part of said surface to remove said protecting group.

2. (Amended) The method recited in claim 1 wherein said radiation sensitive compound is a photosensitive compound or group.

3. (Amended) The method recited in claim 1 wherein said autocatalytic compound is a member selected from the group consisting of a masked acid and pentafluorobenzoic acid.

Please delete claim 4 without prejudice to the filing of any appropriate continuation application.

B2

6. (Amended) The method recited in claim 1 wherein said synthesis intermediate is a member selected from the group consisting of a nucleotide, a DMT protected nucleotide, a polynucleotide, an amino acid, and a polypeptide.

Please delete claim 7 without prejudice to the filing of any appropriate continuation application.

Please delete claim 8 without prejudice to the filing of any appropriate continuation application.

Please delete claim 9 without prejudice to the filing of any appropriate continuation application.

Please delete claim 10 without prejudice to the filing of any appropriate continuation application.

B3

12. (Amended) The method recited in claim 1 wherein said photosensitive compound
USSN 09/578,282
Express Mail No. EL767679561US

B3
is a member selected from the group consisting of a photoactivated catalyst, a photoactivated acid catalyst and toluenesulfonic acid.

C7
Please delete claim 13 without prejudice to the filing of any appropriate continuation application.

Please delete claim 16 without prejudice to the filing of any appropriate continuation application.

C7
Please add the following new claims:

B4
52. A method for removing a protective group from a synthesis intermediate comprising the steps of:

- a) forming a surface comprising
 - i) a photosensitive acid compound or group, the photosensitive acid compound or group producing a catalyst when irradiated, and
 - ii) an autocatalytic compound or group, the autocatalytic compound or group generating a protecting group removing product when the autocatalytic compound is activated by said catalyst; and
- b) irradiating at least a part of the surface to remove the protecting group.

53. The method of claim 52 wherein the photosensitive compound or group is a photoactivated acid catalyst.

54. The method of claim 52 wherein the autocatalytic compound is a member selected from the group consisting of a masked acid and pentafluorobenzoic acid.

B4
cont

55. The method of claim 52 wherein the synthesis intermediate is a linker molecule.

56. The method of claim 52 wherein the synthesis intermediate is a member selected from the group consisting of a nucleotide, a DMT protected nucleotide, a polynucleotide, an amino acid and a polypeptide.

57. The method of claim 52 wherein the removable protecting group is an acid removable group.

58. The method of claim 52 wherein the photosensitive compound is toluenesulfonic acid.

59. The method of claim 53 wherein the photoactivated acid catalyst is selected from the group consisting of naphthoquinone diazide sulfonic acids, 2,1,4-diazonaphthoquinone sulfonic acid esters, 2,1,5-diazonaphthoquinone sulfonic acid esters, 1,1-bis[p-chlorophenyl]-2,2,2-trichloroethane, 1,1-bis[p-methoxyphenyl]-2,2,2-trichloroethane, 1,2,5,6,9,10-hexabromocyclododecane, 1,10-dibromodecane, 1,1-bis[p-chlorophenyl]-2,2-dichloroethane, 4,4-dichloro-2-(trichloromethyl)benzhydrol, hexachlorodimethylsulfone, 2-chloro-6-(trichloromethyl)pyridine, o,o-diethyl-o-(3,5,6-trichloro-2-pyridyl)phosphorothionate, 1,2,3,4,5,6-hexachlorocyclohexane, N(1,1-bis[p-chlorophenyl]-2,2,2-trichloroethyl)acetamide, tris[2,3-dibromopropyl]isocyanurate, 2,2-bis[p-chlorophenyl]-1,1-dichloroethylene, tris[trichloromethyl]triazine, 1,1-bis(chlorophenyl)-2,2,2-trichloroethanol, tris(1,2,3-methanesulfonyl)benzene, tris(trichloromethyl)triazine, and toluenesulfonic acid esters.

USSN 09/578,282

Express Mail No. EL767679561US

B4

60. The method of claim 52 wherein the protecting group is selected from the group consisting of dimethoxytrityl, tert-butylcarbamate, trifluoroacetyl, 9-fluorenylmethoxycarbonyl, isobutyl, benzoyl, phenoxyacetyl, acetamidomethyl, acetyl, tert-amyoxy carbonyl, benzyl, benzyloxycarbonyl, 2-(4-biphenylyl)-2-propyloxycarbonyl, 2-bromobenzylloxycarbonyl, tert-butyl, tert-butyloxycarbonyl, 1-carbobenzoxamido-2,2,2-trifluoroethyl, 2,6-dichlorobenzyl, 2-(3,5-dimethoxyphenyl)-2-propyloxycarbonyl, 2,4-dinitrophenyl, dithiasuccinyl, formyl, 4-methoxybenzenesulfonyl, 4-methoxybenzyl, 4-methylbenzyl, o-nitrophenylsulfenyl, 2-phenyl-2-propyloxycarbonyl, alpha.-2,4,5-tetramethylbenzyloxycarbonyl, p-toluenesulfonyl, xanthenyl, benzyl ester, N-hydroxysuccinimide ester, p-nitrobenzyl ester, p-nitrophenyl ester, phenyl ester, p-nitrocarbonate, p-nitrobenzylcarbonate, trimethylsilyl and pentachlorophenyl ester.

61. A method for synthesizing a polymer array on a substrate comprising the steps of:

- providing a surface of the substrate having one or more synthesis intermediates bound thereon and with the synthesis intermediates having a reactive group protected from reaction by a protective group, a photosensitive acid compound or group, the photosensitive acid compound or group producing a catalyst when irradiated, and an autocatalytic compound or group, the autocatalytic compound or group generating a protecting group removing product when the autocatalytic compound or group is activated by the catalyst;
- irradiating the surface of the substrate with radiation of certain wavelength;
- initiating a catalytic reaction to remove the protective group from the synthesis intermediates to produce unprotected reactive groups;

*B4
cont*

d) reacting a subsequently added synthesis intermediate with the unprotected reactive group, the subsequently added synthesis intermediate having a reactive group protected from reaction by a protective group;

e) repeating steps b) through d), or not, until a desired polymer sequence is obtained.

62. The method of claim 61 wherein the photosensitive acid compound or group is a photoactivated acid catalyst.

63. The method of claim 61 wherein the autocatalytic compound is a member selected from the group consisting of a masked acid and pentafluorobenzoic acid.

64. The method of claim 61 wherein the synthesis intermediate is a linker molecule.

65. The method of claim 61 wherein the synthesis intermediate is a nucleotide, a DMT protected nucleotide, a polynucleotide, an amino acid and a polypeptide.

66. The method of claim 61 wherein the removable protecting group is an acid removable group.

67. The method of claim 61 wherein the photosensitive compound is toluenesulfonic acid.

68. The method of claim 62 wherein the photoactivated acid catalyst is selected from USSN 09/578,282
Express Mail No. EL767679561US

B47

consisting of naphthoquinone diazide sulfonic acids, 2,1,4-diazonaphthoquinone sulfonic acid esters, 2,1,5-diazonaphthoquinone sulfonic acid esters, 1,1-bis[p-chlorophenyl]-2,2,2-trichloroethane, 1,1-bis[p-methoxyphenyl]-2,2,2-trichloroethane, 1,2,5,6,9,10-hexabromocyclododecane, 1,10-dibromodecane, 1,1-bis[p-chlorophenyl]-2,2-dichloroethane, 4,4-dichloro-2-(trichloromethyl)benzhydrol, hexachlorodimethylsulfone, 2-chloro-6-(trichloromethyl)pyridine, o,o-diethyl-o-(3,5,6-trichloro-2-pyridyl)phosphorothionate, 1,2,3,4,5,6-hexachlorocyclohexane, N(1,1-bis[p-chlorophenyl]-2,2,2-trichloroethyl)acetamide, tris[2,3-dibromopropyl]isocyanurate, 2,2-bis[p-chlorophenyl]-1,1-dichloroethylene, tris[trichloromethyl]triazine, 1,1-bis(chlorophenyl)-2,2,2-trichloroethanol, tris(1,2,3-methanesulfonyl)benzene, tris(trichloromethyl)triazine, and toluenesulfonic acid esters.

69. The method of claim 61 wherein the protecting group is selected from the group consisting of dimethoxytrityl, tert-butylcarbamate, trifluoroacetyl, 9-fluorenylmethoxycarbonyl, isobutyrl, benzoyl, phenoxyacetyl, acetamidomethyl, acetyl, tert-amyoxy carbonyl, benzyl, benzyloxycarbonyl, 2-(4-biphenylyl)-2-propyloxycarbonyl, 2-bromobenzylloxycarbonyl, tert-butyl, tert-butyloxycarbonyl, 1-carbobenzoxamido-2,2,2-trifluoroethyl, 2,6-dichlorobenzyl, 2-(3,5-dimethoxyphenyl)-2-propyloxycarbonyl, 2,4-dinitrophenyl, dithiasuccinyl, formyl, 4-methoxybenzenesulfonyl, 4-methoxybenzyl, 4-methylbenzyl, o-nitrophenylsulfenyl, 2-phenyl-2-propyloxycarbonyl, alpha.-2,4,5-tetramethylbenzyloxycarbonyl, p-toluenesulfonyl, xanthenyl, benzyl ester, N-hydroxysuccinimide ester, p-nitrobenzyl ester, p-nitrophenyl ester, phenyl ester, p-nitrocarbonate, p-nitrobenzylcarbonate, trimethylsilyl and pentachlorophenyl ester.

70. A method for removing a protecting group from a synthesis intermediate
USSN 09/578,282
Express Mail No. EL767679561US

comprising the steps of:

- B67
cont*
- a) forming a surface comprising
 - i) a synthesis intermediate having an acid removable protecting group, and
 - ii) a photosensitive acid compound or group, the photosensitive acid compound or group producing an acid when irradiated, and
 - b) irradiating at least a part of the surface with light to generate an acid and to remove the acid removable protecting group.

71. The method of claim 70 wherein the photosensitive compound or group is a photoactivated acid catalyst.

72. The method of claim 70 wherein the synthesis intermediate is a linker molecule.

73. The method of claim 70 wherein the synthesis intermediate is a member selected from the group consisting of a nucleotide, a DMT protected nucleotide, a polynucleotide, an amino acid and a polypeptide.

74. The method of claim 70 wherein the photosensitive compound is toluenesulfonic acid.

75. The method of claim 71 wherein the photoactivated acid catalyst is selected from the group consisting of naphthoquinone diazide sulfonic acids, 2,1,4-diazonaphthoquinone sulfonic acid esters, 2,1,5-diazonaphthoquinone sulfonic acid esters, 1,1-bis[p-chlorophenyl]-

USSN 09/578,282

Express Mail No. EL767679561US

*B4
cont*

trifluoroethane, 1,1-bis[p-methoxyphenyl]-2,2,2-trichloroethane, 1,2,5,6,9,10-hexabromocyclododecane, 1,10-dibromodecane, 1,1-bis[p-chlorophenyl]-2,2-dichloroethane, 4,4-dichloro-2-(trichloromethyl)benzhydrol, hexachlorodimethylsulfone, 2-chloro-6-(trichloromethyl)pyridine, o,o-diethyl-o-(3,5,6-trichloro-2-pyridyl)phosphorothionate, 1,2,3,4,5,6-hexachlorocyclohexane, N(1,1-bis[p-chlorophenyl]-2,2,2-trichloroethyl)acetamide, tris[2,3-dibromopropyl]isocyanurate, 2,2-bis[p-chlorophenyl]-1,1-dichloroethylene, tris[trichloromethyl]triazine, 1,1-bis(chlorophenyl)-2,2,2-trichloroethanol, tris(1,2,3-methanesulfonyl)benzene, tris(trichloromethyl)triazine, and toluenesulfonic acid esters.

76. The method of claim 70 wherein the acid-removable protecting group is selected from the group consisting of dimethoxytrityl, tert-butyloxycarbamate, trifluoroacetyl, 9-fluorenylmethoxycarbonyl, isobutyrl, benzoyl, phenoxyacetyl, acetamidomethyl, acetyl, tert-amyoxy carbonyl, benzyl, benzyloxycarbonyl, 2-(4-biphenylyl)-2-propyloxycarbonyl, 2-bromobenzylloxycarbonyl, tert-butyl, tert-butyloxycarbonyl, 1-carbobenzoxamido-2,2,2-trifluoroethyl, 2,6-dichlorobenzyl, 2-(3,5-dimethoxyphenyl)-2-propyloxycarbonyl, 2,4-dinitrophenyl, dithiasuccinyl, formyl, 4-methoxybenzenesulfonyl, 4-methoxybenzyl, 4-methylbenzyl, o-nitrophenylsulfenyl, 2-phenyl-2-propyloxycarbonyl, alpha.-2,4,5-tetramethylbenzyloxycarbonyl, p-toluenesulfonyl, xanthenyl, benzyl ester, N-hydroxysuccinimide ester, p-nitrobenzyl ester, p-nitrophenyl ester, phenyl ester, p-nitrocarbonate, p-nitrobenzylcarbonate, trimethylsilyl and pentachlorophenyl ester.

77. A method for synthesizing a polymer array on a substrate comprising the steps of:

providing a surface of the substrate having one or more synthesis intermediates bound thereon and with the synthesis intermediates having a reactive group protected from reaction by an acid removable protecting group, and a photosensitive acid compound or group, the photosensitive acid compound or group producing an acid when irradiated;

- b) irradiating the surface of the substrate with light of certain wavelength to generate an acid and to remove the acid removable protecting group and to produce unprotected reactive groups;
- c) reacting a subsequently added synthesis intermediate with the unprotected reactive group, the subsequently added synthesis intermediate having a reactive group protected from reaction by an acid removable protecting group;
- d) repeating steps b) through c), or not, until a desired polymer sequence is obtained.

78. The method of claim 77 wherein the photosensitive acid compound or group is a photoactivated acid catalyst.

79. The method of claim 77 wherein the synthesis intermediate is a linker molecule.

80. The method of claim 77 wherein the synthesis intermediate is a nucleotide, a DMT protected nucleotide, a polynucleotide, an amino acid and a polypeptide.

81. The method of claim 77 wherein the photosensitive compound is toluenesulfonic acid.

PJ
cont

82. The method of claim 78 wherein the photoactivated acid catalyst is selected from the group consisting of naphthoquinone diazide sulfonic acids, 2,1,4-diazonaphthoquinone sulfonic acid esters, 2,1,5-diazonaphthoquinone sulfonic acid esters, 1,1-bis[p-chlorophenyl]-2,2,2-trichloroethane, 1,1-bis[p-methoxyphenyl]-2,2,2-trichloroethane, 1,2,5,6,9,10-hexabromocyclododecane, 1,10-dibromodecane, 1,1-bis[p-chlorophenyl]-2,2-dichloroethane, 4,4-dichloro-2-(trichloromethyl)benzhydrol, hexachlorodimethylsulfone, 2-chloro-6-(trichloromethyl)pyridine, o,o-diethyl-o-(3,5,6-trichloro-2-pyridyl)phosphorothionate, 1,2,3,4,5,6-hexachlorocyclohexane, N(1,1-bis[p-chlorophenyl]-2,2,2-trichloroethyl)acetamide, tris[2,3-dibromopropyl]isocyanurate, 2,2-bis[p-chlorophenyl]-1,1-dichloroethylene, tris[trichloromethyl]triazine, 1,1-bis(chlorophenyl)-2,2,2-trichloroethanol, tris(1,2,3-methanesulfonyl)benzene, tris(trichloromethyl)triazine, and toluenesulfonic acid esters.

83. The method of claim 77 wherein the acid removable protecting group is selected from the group consisting of dimethoxytrityl, tert-butyloxycarbamate, trifluoroacetyl, 9-fluorenylmethoxycarbonyl, isobutyril, benzoyl, phenoxyacetyl, acetamidomethyl, acetyl, tert-amyoxy carbonyl, benzyl, benzyloxycarbonyl, 2-(4-biphenylyl)-2-propyloxycarbonyl, 2-bromobenzylloxycarbonyl, tert-butyl, tert-butyloxycarbonyl, 1-carbobenzoxamido-2,2,2-trifluoroethyl, 2,6-dichlorobenzyl, 2-(3,5-dimethoxyphenyl)-2-propyloxycarbonyl, 2,4-dinitrophenyl, dithiasuccinyl, formyl, 4-methoxybenzenesulfonyl, 4-methoxybenzyl, 4-methylbenzyl, o-nitrophenylsulfenyl, 2-phenyl-2-propyloxycarbonyl, alpha.-2,4,5-tetramethylbenzyloxycarbonyl, p-toluenesulfonyl, xanthenyl, benzyl ester, N-hydroxysuccinimide ester, p-nitrobenzyl ester, p-nitrophenyl ester, phenyl ester, p-nitrocarbonate, p-nitrobenzylcarbonate, trimethylsilyl and pentachlorophenyl ester.